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August 8, 2019

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C., 20554

Re: Unlicensed Use of the 6 GHz Band, ET Docket No. 18-295; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, GN Docket No. 17-183

Dear Ms. Dortch:

AT&T Services, Inc., on behalf of the subsidiaries and affiliates of AT&T Inc. (collectively, "AT&T"), provides the following *ex parte* discussing the key baseline requirements for automated frequency coordination ("AFC") systems in the 6 GHz band. AT&T continues to believe that introduction of unlicensed Radio Local Area Network ("RLAN") devices into the densely populated 6 GHz band raises significant interference concerns. If the Commission pursues such unlicensed use, the implementation of effective AFC systems will therefore be crucial. Because AFC systems would ensure the protection of vital communications links operating in the band on a primary basis, these systems must both proactively prevent interference through their coordination function and be capable of identifying and remediating interference after the fact.

Instead of appropriately assuming the burden of ensuring the protection of primary users in the 6 GHz band, the RLAN community has instead argued that Fixed Service ("FS") users have over-engineered their links, sought to eliminate AFC for broad classes of deployments and attempted to water down the functionality of AFCs—all to allow them to introduce cheap consumer devices to the public as rapidly as possible.[1] But, the consequences of a misstep are dire—the primary FS users in this band support public safety, utility infrastructure, critical industry, and telecommunications backhaul for wireless systems, all of which are vital to the health and well-

[1] *See* Letter from Apple Inc., Broadcom Inc., Cisco Systems Inc., Facebook, Inc., Google LLC, Hewlett Packard Enterprise, Intel Corporation, Marvell Semiconductor, Inc., Microsoft Corporation, and Qualcomm Incorporated ("RLAN Proponents"), to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 (dated July 2, 2019) ("*RLAN VLP Letter*"); Letter from RLAN Proponents and Ruckus Networks, a Business Segment of CommScope, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 (dated July 5, 2019) ("*RLAN LPI Letter*"); Comments of RLAN Proponents and Ruckus Networks, an Arris Company, ET Docket No. 18-295 at 14 (dated Feb. 15, 2019) ("*RLAN Comments*") (arguing, for example, that the Commission can facilitate full potential of 6 GHz "by promulgating rules for unlicensed use that enable low-cost, mass-market devices").

being of the public. In AT&T's view, minimum pre-conditions for admitting unlicensed RLANs into the band are that AFC must be universal for unlicensed devices in the band, AFC must rigorously prevent interference through coordination and mitigate interference events that occur, and AFC systems must be lab- and field-tested with exceptional rigor.

In its Reply Comments in this docket, AT&T previously discussed some of the features that it believed were critical to ensure reasonable protection for primary FS microwave incumbents in the band.[2] In particular, AT&T argued that an AFC system must provide:

- Post-deployment interference remediation—*i.e.*, the ability to individually or collectively control *all* devices in the band (indoor/outdoor, low power or very low power), even after they are introduced into the stream of commerce and sold to consumers;

- Rapid interference resolution that places the administrative and financial burden on new unlicensed entrants (including digital identification of RLAN devices and AFC record retention requirements), instead of requiring primary, FS incumbents to assume the burden of monitoring and triangulating among a large population of intermittent mobile devices when interference occurs;

- Testing and certification requirements to ensure that the AFC operator(s) function properly and in compliance with a detailed set of FCC-administered security, reliability and anti-spoofing requirements such that unauthorized parties cannot access or alter the AFC or the information it sends to a RLAN device;

- Stringent AFC re-validation requirements for RLAN devices (daily or if moved), and the ability to issue "cease and desist" orders, to ensure devices that are interfering cannot continue to operate on "autopilot" after interference is detected;

- Coordination for fixed access points ("APs") and devices under fixed AP control only, deferring potential implementation of drone or mobile coordination until some working history of successful coordination is developed.

As AT&T has spent additional time working with unlicensed device manufacturers, including working on the spectrum access systems in other bands and participation in the Wireless Innovation Forum ("WInnForum") multi-stakeholder workshop on 6 GHz sharing,[3] AT&T believes there are additional core principles and requirements that should be explicitly stated if

[2] Reply Comments of AT&T Services, Inc., ET Docket No. 18-295, GN Docket No. 17-183 at 15-19 (March 18, 2019).

[3] Multi-stakeholder Workshop on Unlicensed Use in the 6 GHz Band (July 17, 2019); *see* https://www.wirelessinnovation.org/6ghz-multistakeholder-workshop (last visited Aug. 6, 2019).

unlicensed RLAN use of the 6 GHz band is authorized. In particular, the Commission should unambiguously mandate that the AFC shall:

- Protect ***all*** Part 101 licensees operating in this band on a primary basis, including newly licensed operators, at current reliability standards;[4]

- Obtain from Part 15 devices authorized in this docket (and retain for audit purposes with tamper-proof security) key RLAN device information, including geographic location, antenna height above ground level (in meters), power class, FCC identification number, user contact information, air interface technology, unique manufacturer serial number, sensing capabilities (if supported), and additional information on its deployment profile, with updates within 24 hours if any registered information changes;

- Be the exclusive mechanism to receive an assignment for operating frequencies required of all Part 15 devices authorized in this docket seeking to transmit in the 6 GHz band (*i.e.*, there should be no newly authorized Part 15 devices permitted to operate in the FS bands without coordination through the AFC);

- Protect incumbent operations from RLAN transmissions that occur both on a co-channel and an adjacent channel basis, with incumbent deployment information refreshed from FCC databases on a daily basis (Comsearch data indicates there are 16 coordination requests and 21 filings for the 6 GHz band per day on average);[5]

- Protect incumbents based on a I/N threshold of -12 dB;[6]

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[4] As noted by FWCC and others, most links in the 6 GHz band operate a 99.999% or 99.9999% reliability, which translates to 5 minute or 30 seconds, respectively, of outage time per year. *See* Letter from Donald J. Evans, Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 at 5 (filed July 25, 2019) ("*FWCC July 25 Letter*"). Although RLAN proponents have attempted to characterize the engineering of FS systems as including "excess" margin, the engineering of radio systems to these reliability levels has a tangible cost, has economic trade-offs, and is not implemented without specific design criteria in mind.

[5] Comments of Comsearch, ET Docket No. 18-295 at 16 (filed Feb. 15, 2019).

[6] While some RLAN proponents have suggested the use of the same -6 dB requirement that applies to FS-to-FS coordinated deployment, RLANs are being introduced on an unlicensed basis, and a more stringent protection threshold is warranted. AT&T believes that it would be appropriate to add an additional 3 dB because unlicensed services are being added as an additional service on top of existing links, which were coordinated to a -6 dB threshold, and a second 3 dB factor to compensate for aggregate interference effects, instead of requiring AFCs to calculate aggregate impacts—that results in a total I/N of -6 dB - 3 dB - 3 dB = -12 dB. Notably, ECC/CEPT has suggested the use of -10 dB for co-primary services and -20 dB for unlicensed-to-licensed service protection, *see* "Sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the frequency band 5925-6425 MHz," Electronic Communications Committee, European

- Utilize appropriate modeling including, for example, propagation losses, clutter losses and building losses, developed though industry organizations like WInnForum.[7]

- Require, as a condition of coordination, that all information provided by the RLAN/Part 15 access device to the AFC must be true, complete, correct, and made in good faith;

- Require from RLAN devices location information, upon any activation from a power-off condition, referenced to the North American Datum of 1983 (NAD83) with a horizontal accuracy of ±50 meters and vertical accuracy of ±3 meters elevation;

- Validate, using the Commission's Equipment Authorization System, the FCC identifier ("FCC ID") of any registering Part 15 device seeking access to its services prior to authorizing the device to begin transmitting;

- Ensure the security and reliability of RLAN devices being coordinated, including checking security credentials to ensure that the RLAN devices operating in this band are FCC-certified and are not using hardware or software that has been altered or modified in an unauthorized manner; and

- Implement components and testing in a technology-neutral manner;

- Be lab-certified by the Commission based on testing criteria developed through an industry organization like WInnForum (including parameters for testing propagation models for exclusion zone determination, co- and adjacent-channel interference protection, registration, location accuracy, and channel availability);

In such regards, the RLAN community has sought to minimize the need for strong AFC protection by incorrectly arguing that existing FS systems include "excess" fade margin and that their modeling of 99.99% reliability is overprotective.[8] As the Fixed Wireless Communications Coalition has recently observed, there is no "excess" fade margin—fade margin is an engineering necessity to ensure that links remain up when experiencing atmospheric or other naturally

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Conference of Postal and Telecommunications Administrations, ECC Report 302 (May 29, 2019); *available at:* https://www.ecodocdb.dk/download/cc03c766-35f8/ECC%20Report%20302.pdf (last visited July 22, 2019) ("*ECC Report 302*"). Similarly, TIA Telecommunications Systems Bulletin 10-F, which has governed FS-to-FS coordination in North America since 1994, discusses a Multiple Exposure Allowance (MEA) in section 2.5.5 of 5 dB to be used in areas congested with many systems. A 5 dB MEA would result in lowering the I/N requirement from a single interferer: -6 dB - 5 dB = -11 dB for multiple ***co-primary*** interferers, which is comparable to the -12 dB I/N AT&T proposes.

[7] *See, e.g., ECC Report 302* at 44-45.

[8] *RLAN VLP Letter* at Attachment, p. 7; *RLAN LPI Letter* at 2, Attachment at p. 15 n.1.

occurring phenomena that affect signal reception.[9] Beyond that, the RLAN proponents are simply incorrect when they argue that existing FS systems have over 50 dB of fade margin—as shown in the Comsearch graphs below, which show fade margin data,[10] the median for the 5.925-6.425 GHz band is 37 dB and the median for the 6.525-6.875 GHz band is 41 dB:[11]

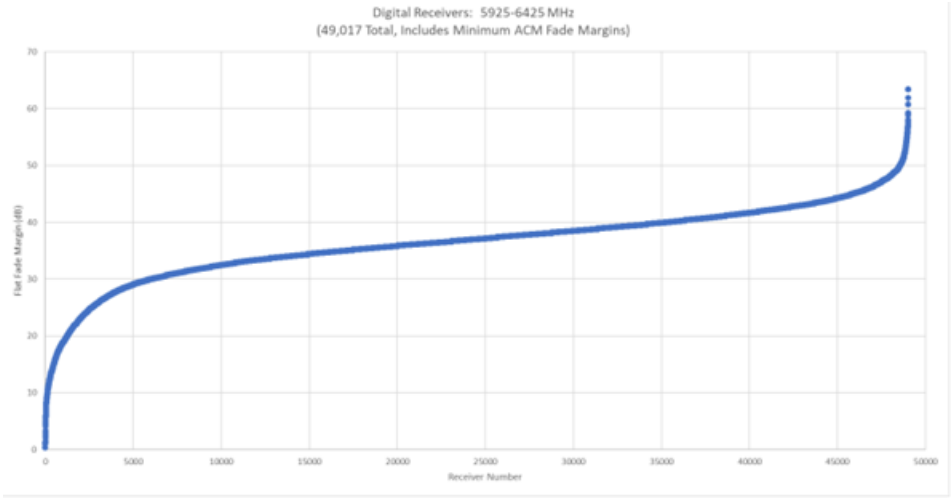

Figure 1: Fade Margin Data, 5.925-6.425 GHz, Median = 37 dB

[9] *FWCC July 25 Letter*.

[10] Plots were based on data from Comsearch's proprietary coordination database, which contains complete operating parameters on all licensed and applied for microwave links in the U.S.

[11] "WInnForum's views, presented by Mark Gibson, CommScope and Chief Regulatory Officer of the Wireless Innovation Forum" at 3-4 (July 17, 2019); *available at:* https://winnf.memberclicks.net/assets/Proceedings/6GHZworkshop/WInnForum%20Views%20on%206%20GHz%20Band%20-%20final.pdf (last visited Aug. 6, 2019).

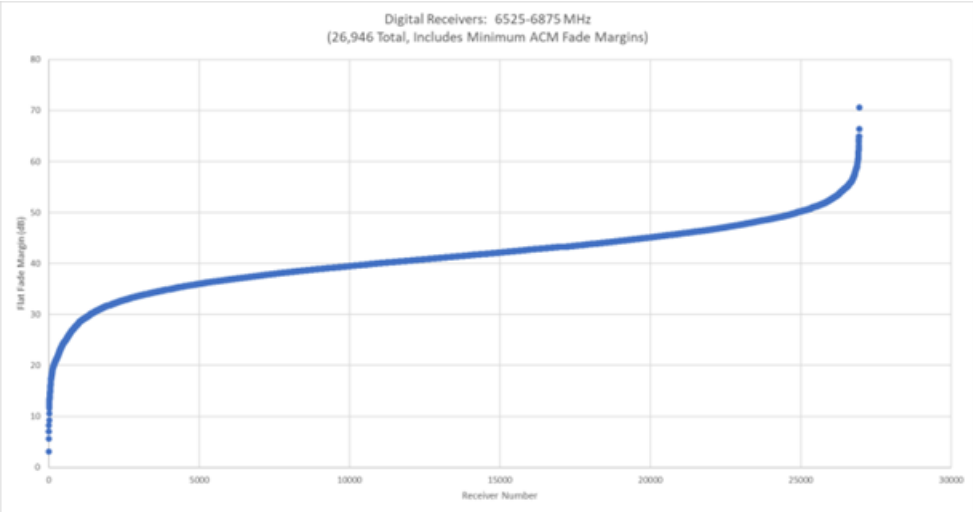

Figure 2: Fade Margin Data, 6.525-6.875 GHz, Median = 41 dB

As shown in the attached plot of multipath fading at an actual microwave site,[12] RLAN proponents are also incorrect that the "[m]ajority of fade margin can be used dB-for-dB by RLANs from 8:00 am to midnight."[13]

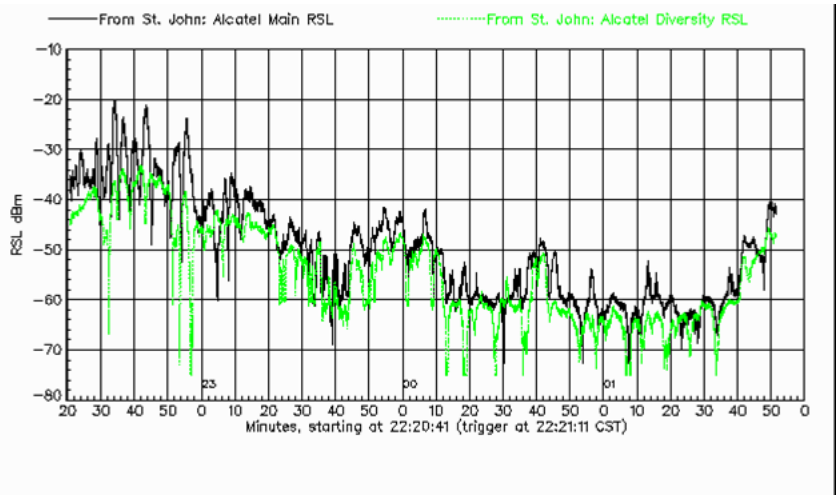

Figure 3: Multipath Fading, RSL Based on Time of Day

[12] "Items for Discussion on Modeling," Doug Davies, Nokia at 3 (July 17, 2019); *available at:* https://winnf.memberclicks.net/assets/Proceedings/6GHZworkshop/RLAN%20Presentation%20July%202019%20-%20Nokia.pdf (last visited Aug. 6, 2019).

[13] "Frequency Sharing for Radio Local Area Networks in the 6 GHz Band," RKF Engineering Services, LLC at 28 (Jan. 2018) (prepared for Apple Inc., Broadcom Limited, Cisco Systems, Inc., Facebook Inc., Google LLC, Hewlett-Packard Enterprise, Intel Corporation, Microsoft Corporation, MediaTek Inc., and QUALCOMM Incorporated) attached to Letter from Paul Margie to FCC, GN Docket No. 17-183 (dated Jan. 26, 2018).

Figure 3 clearly shows, for example, 20 dB fades occurring at 10PM, which is in the middle of that supposedly clear period. While it is true that the links are very active at night and need all of their fade margin during this time, it is not true that the margin is unused prior to midnight. The graph shows deep fades between 10 and midnight as well as after midnight. As a final matter, it is unclear why the RLAN proponents suggest that 99.99% reliability "provides greater protection than what many of these FS links are designed to achieve, further demonstrating the conservative nature of this case study."[14] The study cites to an *ex parte* from the Utilities Telecommunications Council, which actually states their members' networks are engineered for an order of magnitude greater reliability.[15] The RLAN study somehow makes the wildly incorrect assumption that because UTC is able to use individual links with lesser reliability *when using redundant ring pathways*, that all microwave links, whether they have such redundancy or not, and whether they are engineering for five-9s or six-9s of reliability, need only four-9s of reliability.

On balance, AT&T believes the CTIA/Ericsson Proposal is a better-formed solution for responsibly introducing unlicensed use into the 6 GHz band. Even there, however, where the proposal envisions implementation of an AFC system, relocation of FS users, and a funding mechanism to achieve a rough *status quo ante*, additional diligence is needed—more transparency and technical analysis of how FS *would* be accommodated in the 7 GHz band, as well as outreach to National Telecommunications and Information Administration ("NTIA") and other stakeholders to ensure shared federal/non-federal use could be implemented.

Should any questions arise concerning this *ex parte*, please do not hesitate to contact me at (202) 457-2055.

Sincerely,

/s/ Michael P. Goggin
Michael P. Goggin

[14] *RLAN LPI Letter*, Attachment at p. 15 n.1.

[15] "Spectrum and Utility Communications Networks: How Interference Threatens Reliability," M. Douglas McGinnis, Red Rose Tele.com at 15 (2019) (prepared for the Utilities Telecommunications Council) attached to Comments of the Utilities Technology Council, the Edison Electric Institute, the American Public Power Association, the National Rural Electric Cooperative Association, the American Petroleum Institute and the American Water Works Association, ET Docket No. 18-295 (dated Feb. 15, 2019).